

Integrated Water Quality and Aquatic Communities Protocol – Lakes and Ponds

Standard Operating Procedure (SOP) #6: Weather, Physical Conditions, and Site Photography

Draft Version 1.0

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This SOP explains the process for measuring weather and habitat parameters, along with digital documentation of the site using digital cameras.

Weather

Weather observations are of a mostly subjective basis and are intended to convey a sense of the current conditions experienced by both the field crew and the biota of the lake being sampled. Weather conditions should be based on the conditions present upon site arrival and not upon conditions during or after sampling. Large shifts in weather (e.g., change of two or three units on wind scale, change of sunny conditions to cloudy and rain) can be noted in the general field notes section of the data sheet. However, small changes in weather need not be denoted.

1. Categorize the observed weather conditions upon arrival:
 - a. Cloud cover
 - i. Sunny – visible sky has less than 25% cloud cover.
 - ii. Partly Cloudy – visible sky has between 25 and 50% cloud cover.
 - iii. Mostly Cloudy – visible sky has between 51 and 75% cloud cover.
 - iv. Cloudy – visible sky has over 75% cloud cover.
 - b. Precipitation
 - i. No precipitation.
 - ii. Light rain – use this category for precipitation that is “drizzling” or “sprinkling.” A useful distinction is that a light rain would only require intermittent use of windshield wipers when driving a car.
 - iii. Hard rain – use this category for precipitation that is falling rapidly and would quickly result in soaking crew members or gear. This would be a rain that would require frequent use of windshield wipers while driving a car.

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- iv. Light snow – use this category for snow fall that is composed of small flakes that is not actively accumulating snow on the ground. This category is similar to light rainfall, albeit snow.
- v. Heavy snow – use this category for dense snowfall that is actively accumulating on the ground.
- c. Using a compass, record the direction that the wind is coming from. This can be accomplished in several ways:
 - i. Tie a short piece of flagging to the tip of a walking stick, and note the direction the flag is blown towards.
 - ii. Using a handful of fine dirt/sediment/vegetation, slowly pour the material out and note which direction the material is blown.
- d. If white caps are present on the lake, note as such. If ripples are present, note as such.
- e. Air temperature
 - i. Measure and record using an armored thermometer. Place in the shade for at least 15 minutes, so that the thermometer has equilibrated adequately.
- f. Wind scale
 - i. Use a Beaufort wind scale to estimate wind speed (Table 1, Figure 1).

Physical Conditions

The measurements covered here are brief. Although other, in-depth measurements are made, they are collected in the process of other SOPs, and as such are covered in later protocols.

- 1. Inlets/Outlets
 - a. If there are flowing inlets/outlets apparent from the approach hike or initial walk around, record the numbers of each. This will also be recorded in the Trimble GPS survey (SOP #11: Amphibian, Invertebrates, and Lake Substrate Walk-around).
- 2. General terrain (terrestrial)
 - a. Circle the appropriate descriptors to describe the surrounding landscape. If more than one descriptor applies, multiple entries can be marked.
 - i. Forested: If surrounding terrain is composed of obvious, dominant trees.
 - ii. Meadow: If surrounding terrain is composed mostly of grasses, although some shrubs and trees may be apparent.
 - iii. Alpine: If the lake basin and landscape appears to be above the tree line.
 - iv. Sub-Alpine: If the lake basin is below the tree line.

Digital Photos

Digital photographs should be taken at all sites, including instances when a crew decides that a site is unsuitable for sampling (e.g., too shallow, dry, access time too long, etc.). The minimum number of photographs to be taken is four, looking in the cardinal directions (North, South, East, and West). Direction should be determined using a compass. If time allows, the photos should be taken across the waterscape. If the lake is large, some photos may be taken during the amphibian

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survey and walk-around (SOP # 11: Amphibian, Invertebrates, and Lake Substrate Walk-around). Metadata for digital documentation must be entered into the datasheet (Appendix F). Although four images is the minimum, crews are encouraged to take additional photos, especially of sampling activities, unusual habitat features, or of scenic interest. However, the metadata standards must be maintained (SOP #14: Photo Management).

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Table 1. Wind scale guide. Use your best judgement and try to use multiple descriptors in doing so (e.g., land and lake conditions).

Beaufort number	Wind speed		Description	Wave height		Lake conditions	Land conditions
	mph	m/s		m	ft		
0	<1	<0.3	Calm	0	0	Flat.	Calm. Smoke rises vertically.
1	1-3	0.3-1.5	Light air	0.1	0.3	Ripples without crests.	Wind motion visible in smoke.
2	4-7	1.5-3.3	Light breeze	0.2	0.7	Small wavelets. Crests of glassy appearance, not breaking	Wind felt on exposed skin. Leaves rustle.
3	8-12	3.3-5.5	Gentle breeze	0.6	2	Large wavelets. Crests begin to break; scattered whitecaps	Leaves and smaller twigs in constant motion.
4	13-17	5.5-8.0	Moderate breeze	1	3.3	Small waves.	Dust and loose paper raised. Small branches begin to move.
5	18-24	8.0-10.8	Fresh breeze	2	6.6	Moderate (1.2 m) longer waves. Some foam and spray.	Branches of a moderate size move. Small trees begin to sway.
6	25-30	10.8-13.9	Strong breeze	3	9.9	Large waves with foam crests and some spray.	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	31-38	13.9-17.2	High wind, Moderate Gale, Near Gale	4	13	Sea heaps up and foam begins to streak.	Whole trees in motion. Effort needed to walk against the wind.
8	39-46	17.2-20.7	Fresh Gale	5.5	18	Moderately high waves with breaking crests forming spindrift. Streaks of foam.	Twigs broken from trees. Cars veer on road.

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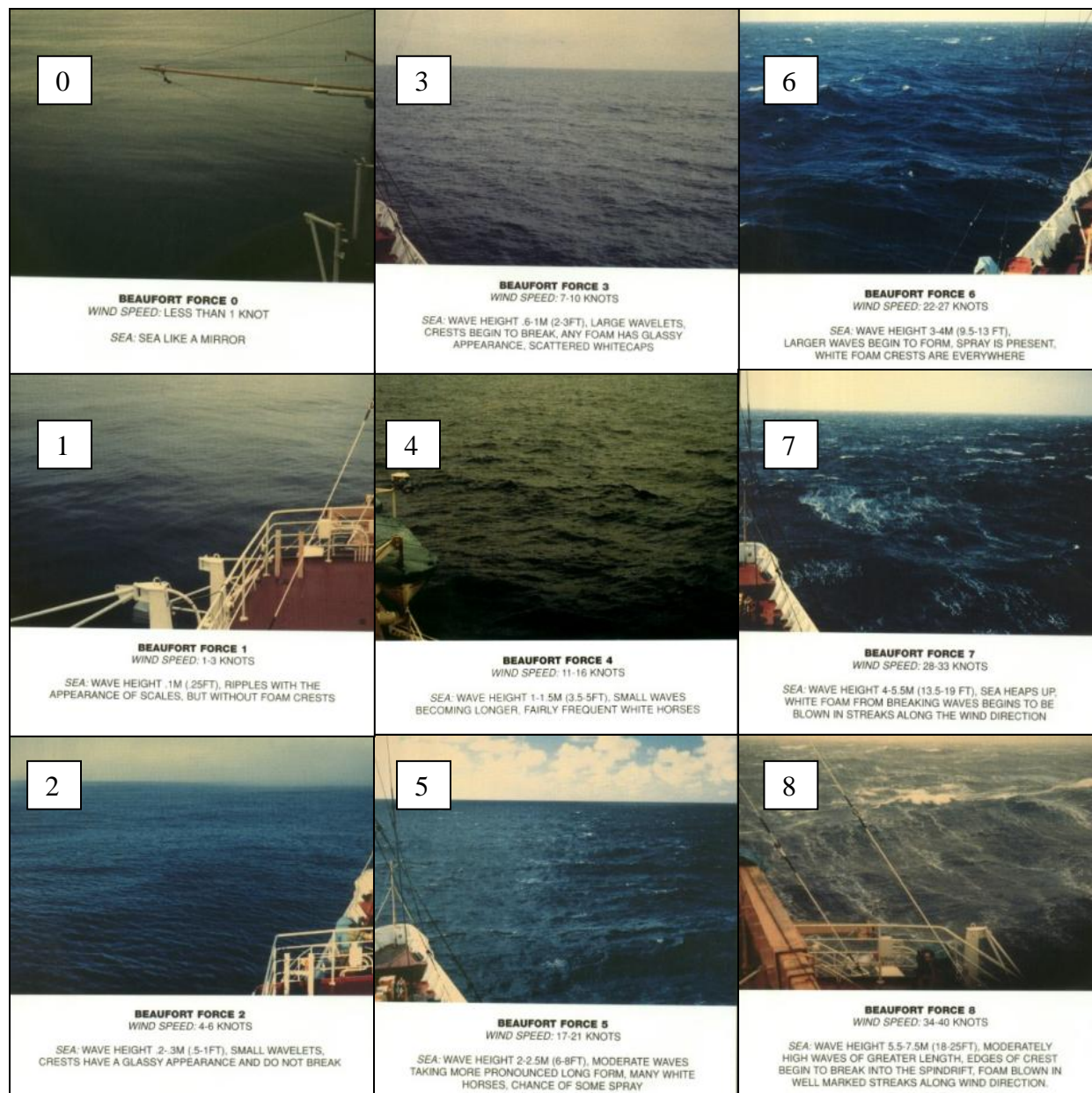


Figure 1. Pictorial guide to Beaufort Wind Scale, to be used in conjunction with Table 1.